

Percent Identity

	1	2	3	4	5	6	7	8	9	10	11	12	
1		49.8	64.3	61.7	33.4	30.8	28.2	16.9	61.0	29.9	25.1	18.6	hOP1
2			50.7	50.2	30.6	27.3	30.6	22.3	50.7	23.9	26.6	19.7	hOP2
3		42.2	72.4	59.3	31.3	29.8	29.7	18.8	60.1	24.2	22.9	17.8	hBMP5
4		51.3	76.9	55.7	31.2	31.6	29.7	21.2	91.4	30.1	23.2	21.0	hBMP6
5		132.3	144.0	136.2	136.8	27.0	24.0	12.6	32.1	19.7	20.4	12.7	60A
6		142.3	162.3	146.6	131.9	175.7	62.1	21.2	32.8	31.3	38.6	26.0	hBMP2
7		148.4	150.3	147.5	137.4	189.1	48.2	21.5	30.9	29.9	40.7	22.3	hBMP4
8		199.0	193.6	219.0	209.0	226.0	207.0	194.5	22.0	34.4	19.4	19.6	hGDF1
9		51.5	77.9	52.5	8.8	140.5	129.0	136.6	209.0	31.0	22.9	15.9	mBMP6(Vgr1)
10		166.3	165.1	188.1	162.5	195.1	141.4	158.3	123.3	158.9	23.1	20.6	zVg1
11		165.5	172.6	165.2	173.1	196.7	104.1	102.0	214.0	173.3	179.2	17.2	Dpp
12		285.0	271.0	276.0	260.0	285.0	261.0	237.0	255.0	243.0	264.0	12	hBMP3
	1	2	3	4	5	6	7	8	9	10	11	12	

Divergence

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	M-GLGRRLLAALAGLQGLL	LRPPLPALAAAAG	AG
hOP1	MEVRSIRAAAPHSFVA	LWAPLFLRSALAD	FSL
hOP2	MTALPGP	LWLGLALCALGGG	GP
hBMP5	MHLTVFLKGTGVF	LWSCWLVGYAKGG	IG
hBMP6	MPGLGRRACWMLCWMWGLLSCCGP	PPLRPPLPAAAAAAGG	QLLGAGGS
60A	MSGRLNITSEAVAVLASIG	LGMVLLMFVATTPPA	VEATQSG
hBMP2	MVAGTRCLLALLPQVLLGGA	AGLVPELGRRKFAAAS	SGRP
hBMP4	MIPGNRMIMVVLLOQVLLGGAS	HASLIPEIGKKKVAETQG	HAGGR
hGDF1	MPPPPQQPGGHLLLL	LALLPLSLPLTRAP	
mBMP6 (Vgr1)	MPGLGRRACWMLCWMWGLLCS-CGP	PPLRPPLPVAAAAGG	QLLGAGGS
zVg1	MFLVL	LRACLLTSLCSPA	
Dpp	MRAMLLLLAVLATFQTIVRVASTEDISQRFIAAIPVAHHIPIASASGSGRSRSGASTSTALAKAFNPFSEPAFSDSDKSHRSKTNKKPSKSDA		
hBMP3	MAGASRLLLFLWLGCFVCVSLAQG	ERPKPFPPELRKAVFGD	RTAGGG
hOP1		RRLOSHE	
hOP2		VHSSFHRRRLRSQE	
hBMP5		PPPGCPQRRILGARE	
hBMP6		VHSSFTYRRLLNHE	
60A		SSSGFLYRRLLKTQE	
hBMP2		KQQTIMHRVLSDEDD	
hBMP4		SSQPSDE	
hGDF1		RSGQSGHE	
mBMP6 (Vgr1)		VPPG	
zVg1		SSSGFLYRRLLKTHE	
Dpp		EDDGL	
hBMP3	NRQFNEVHKPRIDQLENSKNKSKQLVNKPNHNKMAVKEQSRHKKSHHRSHPKQKQASASTESHQSSSIESIFVEEPTLVLDREVASINVPANAKAIIAE		
		PD	
		SELQPD	

Monday, June 02, 2003 9:34 AM

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-----LREVOKEILSVILGPHRPRP-----PGOLA-----SAPLFMLDLYNAMSCE-----
210 220 230 240 250 260 270 280 290 300
-----RREMQREILSIILGPHRPHL-----QKHN-----SAPMFMLDLYNAMAVE----- 94
-----RQDVQREILAVILGPHRPRAP-----PAASRLP-----ASAPLFMLDLYHAWAGD----- 88
-----RREIQREILSIILGPHRPPFS-----PGQAS-----SAPLFMLDLYNAMTNE----- 92
-----KREMQREILSVILGPHRPRPLHGLQOPPALR-QQEQQQQQQLPRGEPPLGRLKSAPLFMLDLYNALSNDDEGGA 152
-----KLDVSYEILFLGIAERPHLS-----SHQLSLR-----KSAPKFLLDVYHRITAE----- 107
-----VLSEFELRLSMFGLKQRPDP-----SRD-----AVVPFYMFLDLYRRHSGQ----- 90
-----LLRDFEATLLQMFGLRRRQDP-----SKS-----AVIPDYMRLDLYRLQSGE----- 94
-----PAAALLOALGLRDEPQG-----APRLR-----PVPPVMWRLFRRRDPQ----- 73
-----KREMQREILSVILGPHRPRPLHGLQOPPFVLPPQQQQQQQQQTAREEPPLGRLKSAPLFMLDLYNALSNDDEGGA 150
-----VQEKLFSSMGLWSRPK-----PSHHA-----AVPSQMWKLFKQASKQ----- 63
QGPSTYSKEALIKDKLPDPSTLVEIEKSILLSFNMRPKI-----DRSK-----IILPEPMKKLYAEIMGH----- 264
-----KVSEHMLRLYDRYSTVQAAAR-----TPGSLEGGSQ-----PWRPRLIREGNTVRSFR----- 102
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hBMP6 (Vgr1)

zVg1

Dpp

hBMP3

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-----EGEPGAAHS-----L-----L-S-QDSRFLNDADIVMSFVNIVE-----LDKDFSHSHRHHKEKFDLSC-----
310 320 330 340 350 360 370 380 390 400
-----EG-----GGPGGQGFSS-----YPYKAVFS-----TQGPPLASLQDSHFLTDADWMSFVNIVE-----HDKEFFHPRYHHREFFDLISK 162
-----DDEGAPAE-----R-----LGRADIVMSFVNIVE-----RDRALGHQEPHWKEFRFDLTQ 134
-----ENPESEYSVRASIAEETRGARKGYPASPNGYPRRIQISRTITLTQSPPLASLHDINFNDADWMSFVNIVE-----RDKDFSHQRRHYHKEFRFDLTQ 184
SEGERQQSWPHEAASSQRPPGAAHP-----LNRKSLLAPGSGS-GGASPLTSAQDSAFNDADWMSFVNIVE-----YDKEFSRQRRHHKEKFNLSQ 244
-----EGLSDQ-----DEDDDYERGRSR-----RSADLEEDEBG-EQOKNFITDLDKRAIDESDIIMTFINKRH-----HNVDIELR-HEHGRRLWFVDVN 184
-----PGSPAPDHR-----LERAASRANTVRSFHHES-----LEELPETSGKITRRFFFNLS 138
-----EEEEQIHSTG-----LE-----YPERPASRANTVRSFHHEEH-----LENIPTGSENASFRFLNLS 144
-----ETRSGSRRT-----SPGVT-----LQCHVEELGVAGNIVRHIHDRGAPTFRASEFVSAGHCPEWTVFDSL 134
SEGVGQEPGSHGASSQLRQSPGAAHS-----LNRKSLLAPGPG-GGASPLTSAQDSAFNDADWMSFVNIVE-----YDKEFSRQRRHHKEKFNLSQ 241
-----TVN-----DPCVVSEYGVGNIVRFMDQGS-----LISAPAVHSFNCVRKHLFFNMSV 111
-----ELDSVNIPK-----PGLLTKSANTVRSFTHKDS-----KIDD-RFPHHRRFLHFDVKS 311
-----AAAAETLERKGLYIFNLTSITK-----SENILSATLYFCIGELGNISLCPVSGGCSHHAQRKHIQIDLSAWTLKFSRNC 176
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hOP1

hOP2

hBMP5

hBMP6

60A

hBMP2

hBMP4

hGDF1

mBMP6 (Vgr1)

zVg1

Dpp

hBMP3

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	410	420	430	440	450	460	470	480	490	500	
hOP1	IPBGEAVTAAELRIYKDAVSGAFK--NRTH-----	ISIVQVLOE---	HVGRESDLFLDTRIVWASEEGWLVFDTAASNRWV--	KPOHNLG							
hOP2	IPBGEAVTAAEFRIYKYRERFD--NEIFR-----	ISVYQVLOE---	HLGRESDLFLDSTRITLWASEEGWLVFDTATSNHWV--	NPRHNLG	24						
hBMP5	IPAGEAVTAAEFRIYK-VPSIHLL--NRTH-----	VSMFQWQE---	QSNRESDLFFLDLQITRAGDEGWLVDVTAASDCWLL--	KRHKDLG	21						
hBMP6	IPHGEAVTAAEFRIYKDRSNRFE--NETIK-----	ISIQIILKE---	YTNRDADLFLDTRKAQALDVGWLVDITVTSNHWI--	NPQNNLG	26						
60A	IPBGEVTTAAEFRIYKDCVMGSFK--NQTF-----	ISIQVLOE---	HQHRDSDLFLDTRVWASEEGWLEFDTATSNLWV--	TPQNNMG	32						
hBMP2	VNDNYLVMDELRIYQANECKMLTANREFT-----	ITVYALIG-----	TLGQHT--MEPLSSVNTIGDYVGMLELNVTEGLHEWL--	KSKDNHG	26						
hBMP4	IPTEEFITSAELQVREQMDALG--NNSSFHH-----	RNIYEI IKP--	ATANSKFVTRLLDTRLVANOASRWESFDVTPAVMRWTA--	QGHANHG	22						
hGDF1	IPENEAISSAELRLFREQVDCQPD--WEGF-----	RNIYEMKPPAEVVPCHLLTRLLDTRLVHNVTWELTFDVS PAVLRWIR--	EKQPNYG	23							
mBMP6 (Vgr1)	VEPAERPSRARLEIRFAAAAAAP--EGWE-----	LSVAAQAGQAGADPGVLLRQLVP--	ALGPPVRAELLGAAWARNASWP--	R---	SLR	21					
zVg1	IPBGEAVTAAEFRIYKDCVGSFK--NQTF-----	ISIQVLOE---	HQHRDSDLFLDTRVWASEEGWLEFDTATSNLWV--	TPQNNMG	32						
Dpp	IEEVEQLSLAQLEMFKQDILLG--PHVFS-----	VDLYRVLKTTLKGVTHESSRKLLOSQTLSPGAHASVLNLTINLAQSWR--	KPEKNFG	19							
hBMP3	IPADEKLKAAELQLTRDALSQVW--ASRSSANTRY-----	QVLVYDITRV--	GVRGQREPSYLLDITKIVRLNSIDIVSLDVQPAVDRLA--	SPQPNYG	40						
	SQILLGHLSDVMAKSHRDI MSWLSKDI TQFLRKAKENEELIGNITSGRQLPKRRLPFPEPYILVYANDAAI	SEPESVSSLQGRNFPTGIVPKWDSH	27								
	LOLEVEITLD-----	GRHVNPRRAGLVGRDGRGSKOPFMVTFEKA SEVHARTIRAS-----	RR-Q-RNKSQSQSDSVRPSNVSD-----	S-----	ACKRHELY						
hOP1	LQLSVETLD-----	GQSNPKLAGLIGRHGPQNKQPFMVAFFKATEVHERSIRSTIGS--	KQSRQNRSKTPKNQELRMANVAENSSDQRA	LTKKHLY	33						
hOP2	LRLVYETED-----	GHSVDPLAGLIGQAPRSQQPFVITFRASPPIRTIPRAVRP--	LRRQPKKSNELPQANRLPGITFDDVHGSHGRQVCRHLY	30							
hBMP5	LQLCATGED-----	GRSINVKSAGLVGRQGPQSKQPFMVAFFKASEVILRSVRAAN--	KRKNQNRNKSSSHQDSRWSSVGDYNTSEQKQACKHLY	35							
hBMP6	LQLSVVTRD-----	GVHVHPRAAGLVGRDGPYDKQPFMVAFFKVSEVHVTRTIRASS--	RRQQRNRSTQSDVARVSSASDYNSSELKTACRKHLY	41							
60A	TYTGAHAVNR-----	PDREVKLDDIGLIRKVDDEFQPFMIGFTRGPE--	LKATAHSSH--	HRSKRSASHPRKRKKSVPANNVPLEPMESTRSCQMOTLY	36						
hBMP2	FVVEVAHLEEKQGVSKRHVRI	SRSILHQDEHSWSQIRPLLVTFGHDGKGHPLHNR-----	EKRQAKHK--QRKRLKS-----	SKRHPLY	30						
hBMP4	LAIEVTHLHQTRTHQGHVRI	SRSILPQSGNWAQLRPLLVTFGHDGRGHALTTRRR-----	AKRSPKHSQAPAKKNK-----	NCRHSLY	31						
hGDF1	LALALRPRAP-----	AAACARIA--	EASILLVTLDP-----	RLCHPL-----	ARPRDAEPVLGGPGG-----	ACRARRLY	27				
mBMP6 (Vgr1)	LQLSVVTRD-----	GLHVNPRAGLVGRDGPYDKQPFMVAFFKVSEVHVTRTIRASS--	RRQQRNRSTQSDVSRGSGSSDYNGSELKTACKHLY	41							
zVg1	MQLELQVMHLN-----	NMLHDHAYVQIPDIHATLVVVSINP-----	LQCR-----	SRRKRSASYTLPTPSN-----	VCKPRRLY	26					
Dpp	LLVEVRTVRSLLKPAPHHVRLRRSADAEHERWQHQPILLFTYTDG	RHKARSIRDVSGEGGKGGRNKRQPRRP--	TRRNKHDD-----	TCRRHSLY	49						
hBMP3	IRAALSITERRRKRSTGVLLPLQNNELP	GAEFYQYKQDEVWEERKPYKITLQAQAPEKSNKKQKRGPHRKSQTLQ	DFEQITLKKARRKQWIEPRNCARRYLK	37							

VSFSDLGWODWI IAPEGYAAANYCHGECSFPI NAHMYA ---TNHAI VOTLVLHIMNPEK -VPKCCAPTKLSAISVLVFDNNSNVLKCYRNMVVRACGCH

hOP1	431
hOP2	402
hBMP5	452
hBMP6	512
60A	452
hBMP2	398
hBMP4	408
hGDF1	372
mBMP6 (Vgr1)	510
zVg1	352
Dpp	588
hBMP3	472

hOP1	431
hOP2	402
hBMP5	452
hBMP6	512
60A	452
hBMP2	398
hBMP4	408
hGDF1	372
mBMP6 (Vgr1)	510
zVg1	352
Dpp	588
hBMP3	472

Percent Identity

	1	2	3	4	5	6	7	8	9	10	11	12	
1		49.8	64.3	61.7	33.4	30.8	28.2	16.9	61.0	29.9	25.1	18.6	1
2			50.7	50.2	30.6	27.3	30.6	22.3	50.7	23.9	26.6	19.7	2
3		42.2	72.4	59.3	31.3	29.8	29.7	18.8	60.1	24.2	22.9	17.8	3
4		51.3	76.9	55.7	31.2	31.6	29.7	21.2	91.4	30.1	23.2	21.0	4
5		132.3	144.0	136.2	136.8	27.0	24.0	12.6	32.1	19.7	20.4	12.7	5
6		142.3	162.3	146.6	131.9	175.7	62.1	21.2	32.8	31.3	38.6	26.0	6
7		148.4	150.3	147.5	137.4	189.1	48.2	21.5	30.9	29.9	40.7	22.3	7
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9		51.5	77.9	52.5	8.8	140.5	129.0	136.6	209.0	31.0	22.9	15.9	9
10		166.3	165.1	188.1	162.5	195.1	141.4	158.3	123.3	158.9	23.1	20.6	10
11		165.5	172.6	165.2	173.1	196.7	104.1	102.0	214.0	173.3	179.2	17.2	11
12		285.0	271.0	276.0	260.0	285.0	261.0	237.0	255.0	265.0	243.0	264.0	12
	1	2	3	4	5	6	7	8	9	10	11	12	

hOP1
hOP2
hBMP5
hBMP6
60A
hBMP2
hBMP4
hGDF1
mBMP6(Vgr1)
zVg1
Dpp
hBMP3

Divergence